UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,951,465 B2
APPLICATION NO. :10/603047
DATED : October 4, 2005
INVENTOR(S) : Sweetland et al.

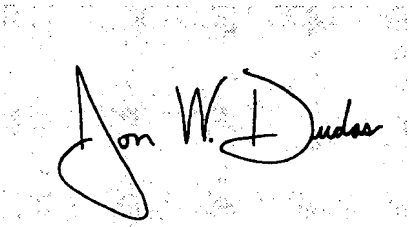
It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

THE TITLE PAGE SHOWING ILLUSTRATIVE FIGURE, SHOULD BE DELETED AND SUBSTITUTE THEREFORE THE ATTACHED TITLE PAGE

DELETE DRAWING SHEETS 1-40 AND **SUBSTITUTE** THEREFORE THE DRAWING SHEETS CONSISTING OF FIGS 1-41 AS SHOWN ON THE ATTACHED PAGE.

Signed and Sealed this

Twenty-eighth Day of August, 2007



JON W. DUDAS
Director of the United States Patent and Trademark Office

(12) **United States Patent**
Sweetland et al.

(10) **Patent No.: US 6,951,465 B2**
(45) **Date of Patent: Oct. 4, 2005**

(54) **MULTIPLE-CONTACT WOVEN POWER CONNECTORS**

(75) Inventors: **Matthew Sweetland**, Medford, MA (US); **James Moran**, Somerville, MA (US)

(73) Assignee: **Tribotek, Inc.**, Burlington, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 10/603,047

(22) Filed: Jun. 24, 2003

(65) **Prior Publication Data**

US 2004/0005793 A1 Jan. 8, 2004

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/375,481, filed on Feb. 27, 2003, which is a continuation-in-part of application No. 10/273,241, filed on Oct. 17, 2002.

(60) Provisional application No. 60/348,588, filed on Jan. 15, 2002.

(51) **Int. Cl.**[7] **H01R 12/00**

(52) **U.S. Cl.** 439/67; 439/329; 439/493

(58) **Field of Search** ..... 439/66–67, 91, 439/591, 482, 493, 329, 496, 930; 361/218; 174/117 M; 29/705

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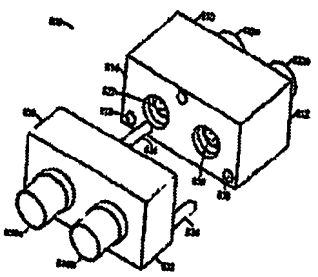
WO	WO 01/75778	10/2001

Primary Examiner—Gary Paumen
Assistant Examiner—Edwin A. Leon
(74) *Attorney, Agent, or Firm*—Wilmer Cutler Pickering Hale and Dorr, LLP

(57) **ABSTRACT**

Multiple-contact woven power connectors are provided that have at least a first set of loading fibers and at least a first set of conductors. When woven onto a set of loading fibers, the conductors define a space. The loading fibers are capable of delivering contact forces at the contact points of the conductors. The conductors can include a power circuit or a return circuit. The power connectors may also include tensioning springs that are capable of generating tensile loads within the loading fibers. The power connectors may further include mating conductors that can be coupled to the power/return circuits. When disposed within the first and second spaces, respectively, electrical connections between the conductors and the mating conductors can be established.

138 Claims, 40 Drawing Sheets



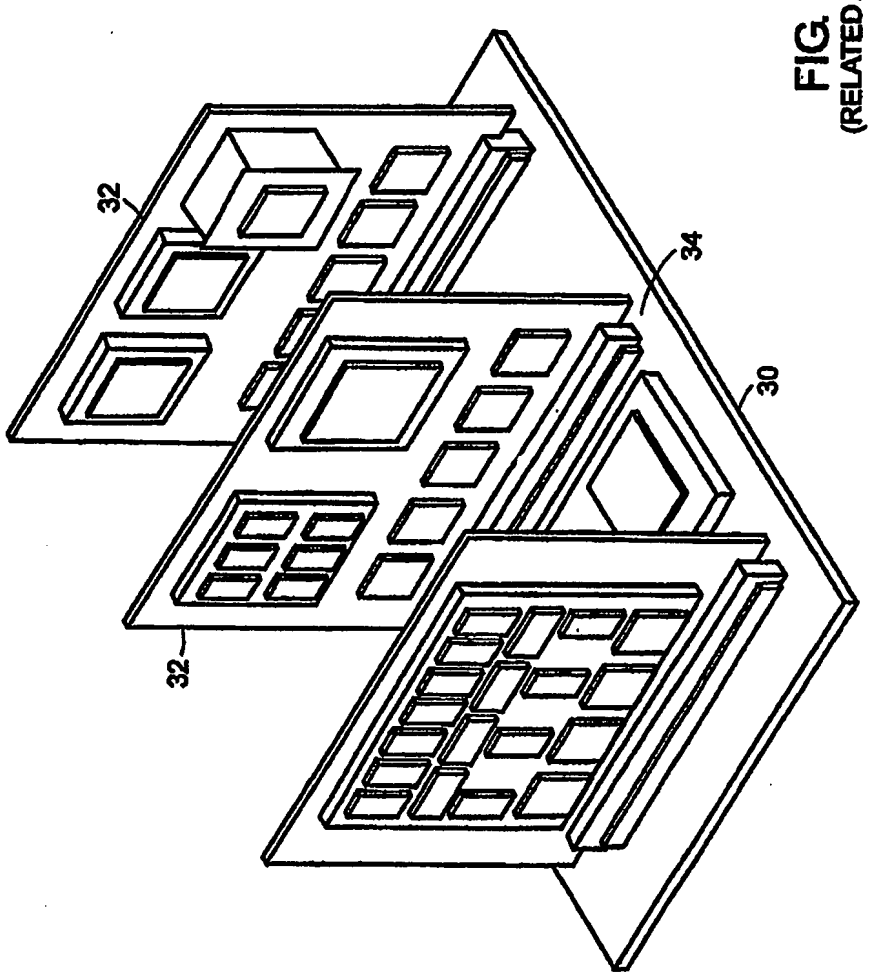


FIG. 1
(RELATED ART)

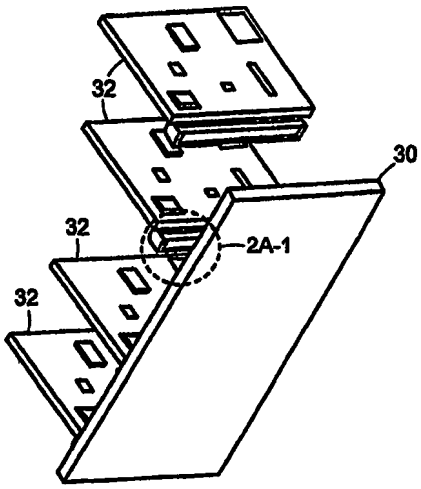


FIG. 2A
(RELATED ART)

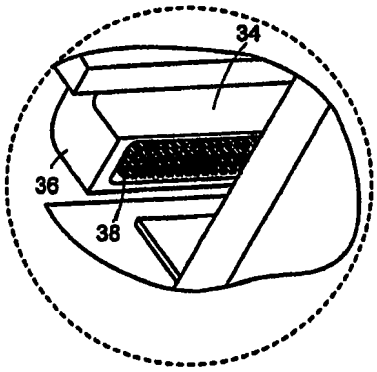


FIG. 2A-1

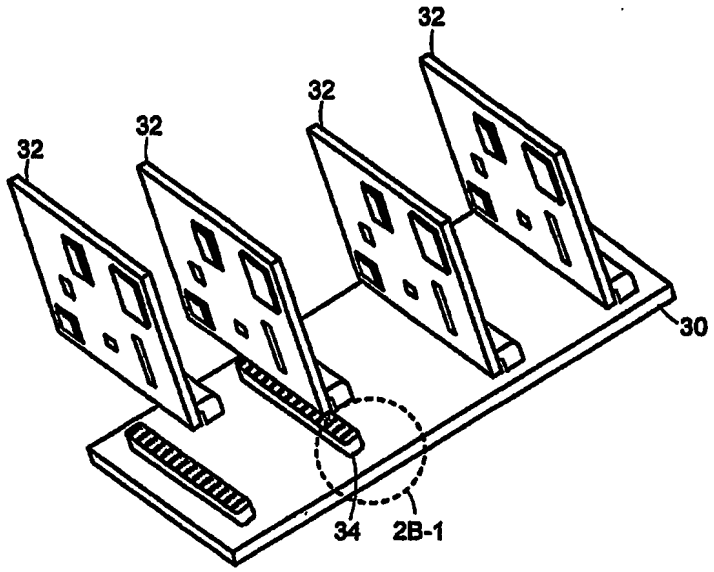


FIG. 2B
(RELATED ART)

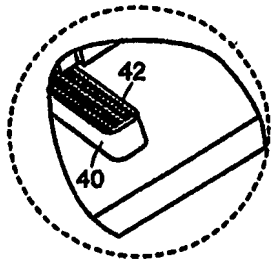


FIG. 2B-1

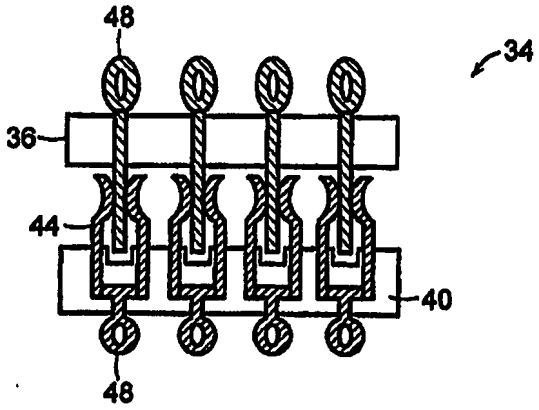


FIG. 3A
(RELATED ART)

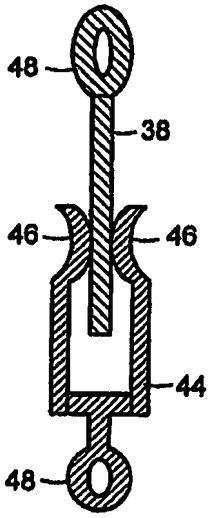


FIG. 3B
(RELATED ART)

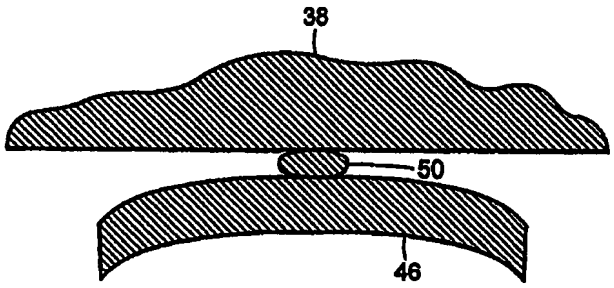


FIG. 4A

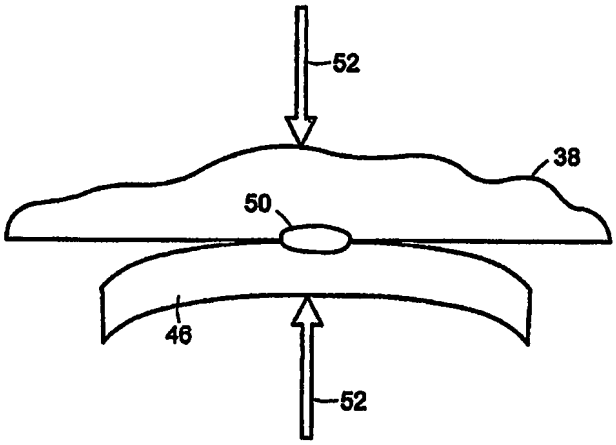


FIG. 4B

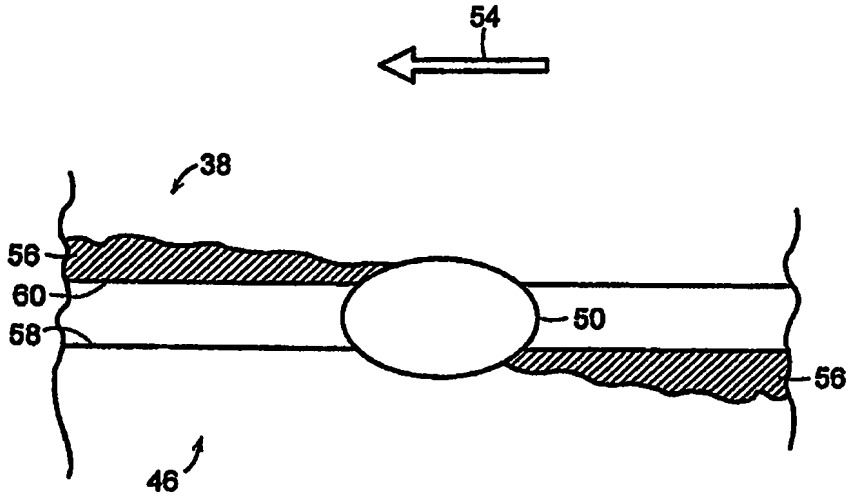


FIG. 5

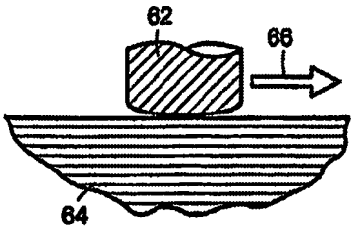


FIG. 6A

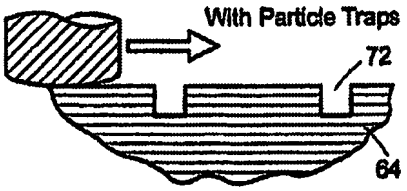


FIG. 6D

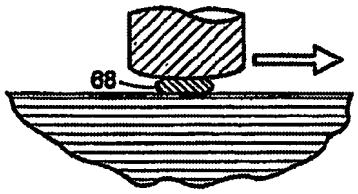


FIG. 6B

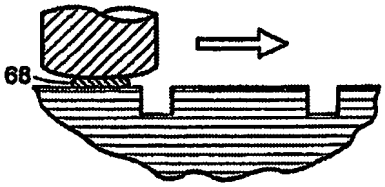


FIG. 6E

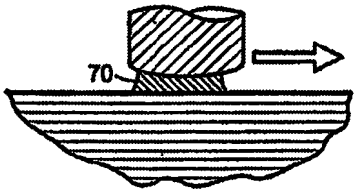


FIG. 6C

No Particle Traps

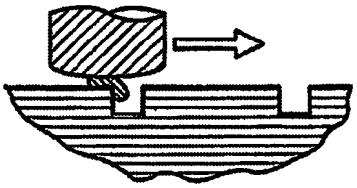


FIG. 6F

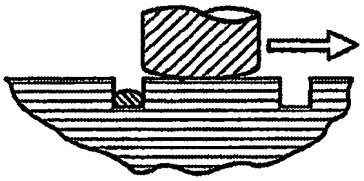


FIG. 6G

RELATED ART

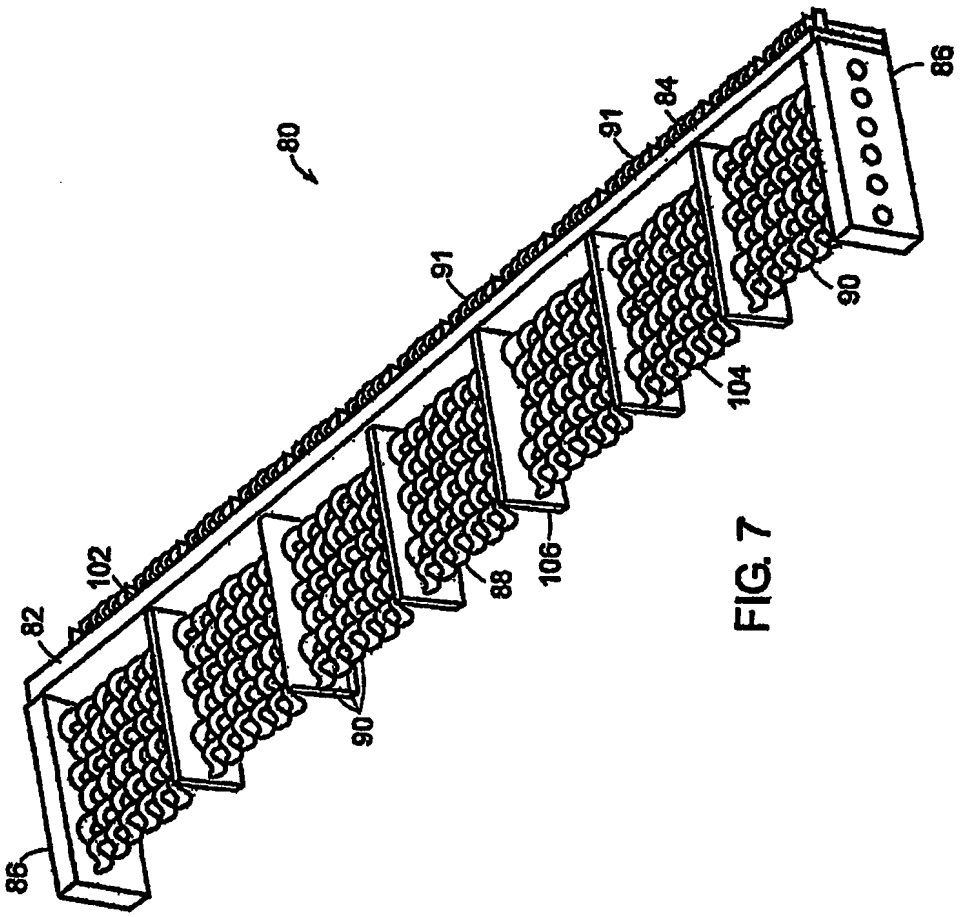


FIG. 7

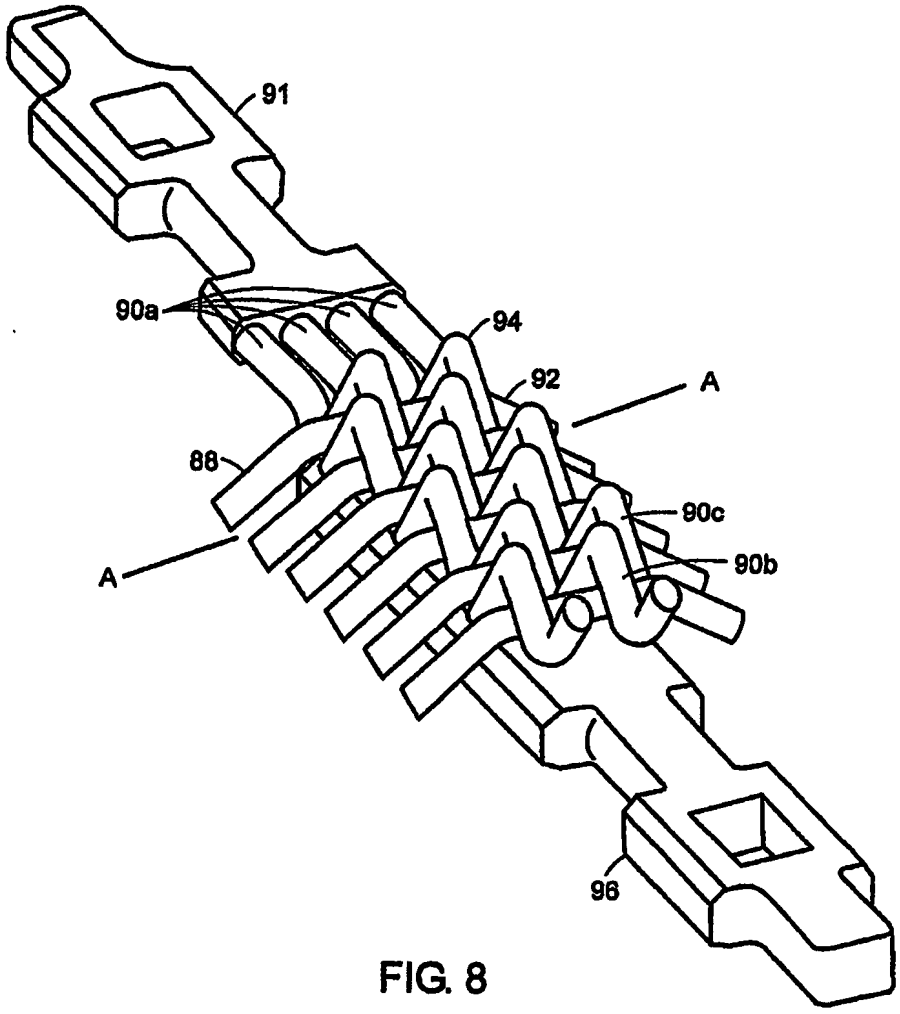


FIG. 8

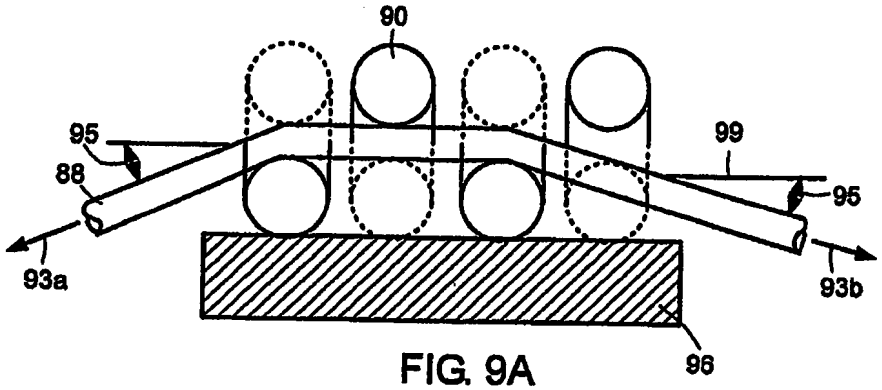


FIG. 9A

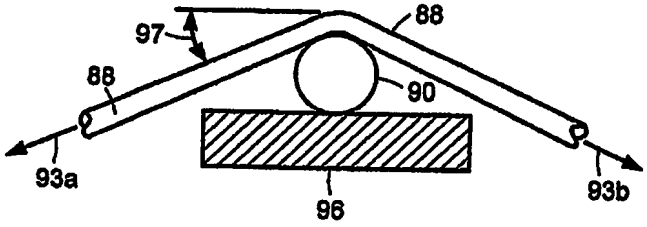


FIG. 9B

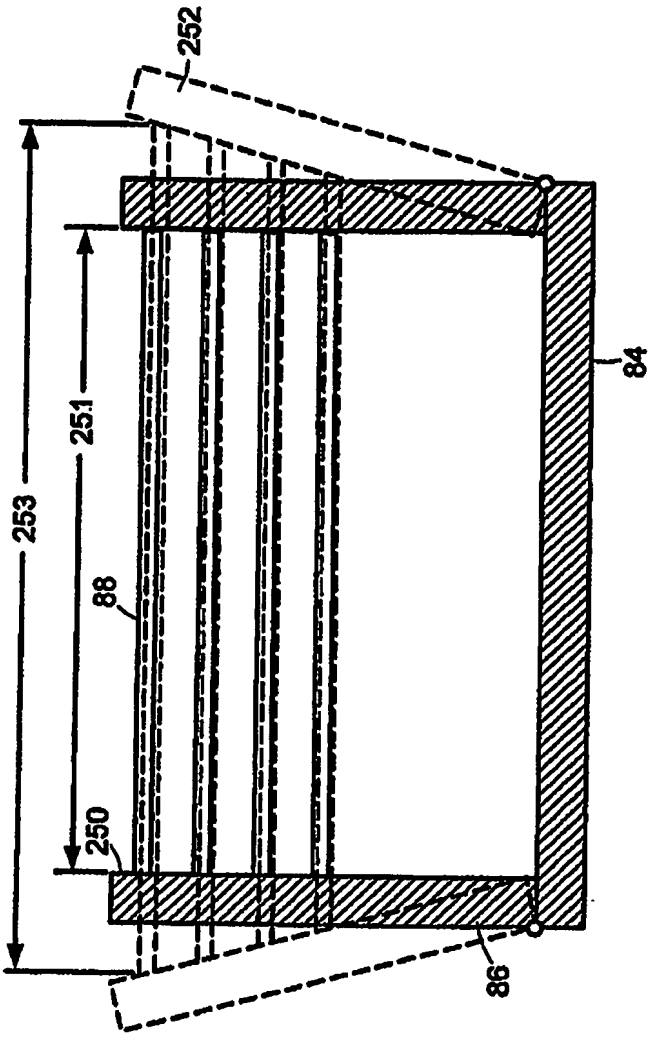


FIG. 10

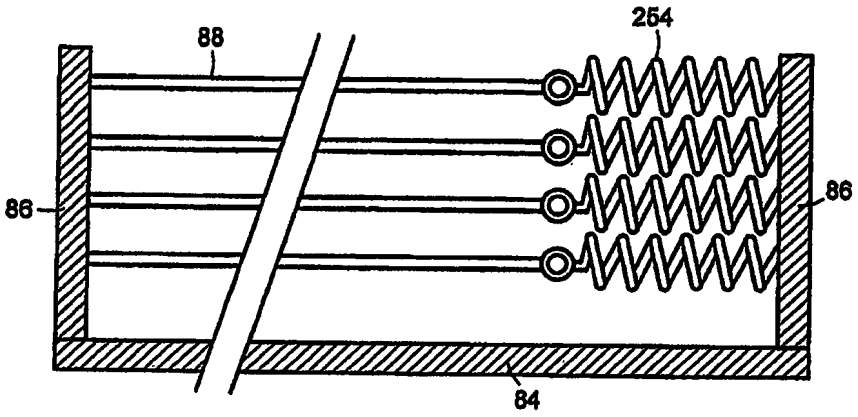


FIG. 11

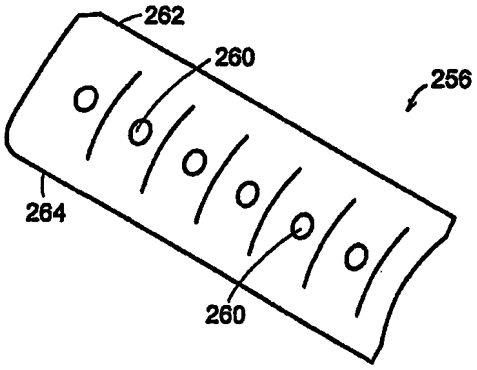


FIG. 12

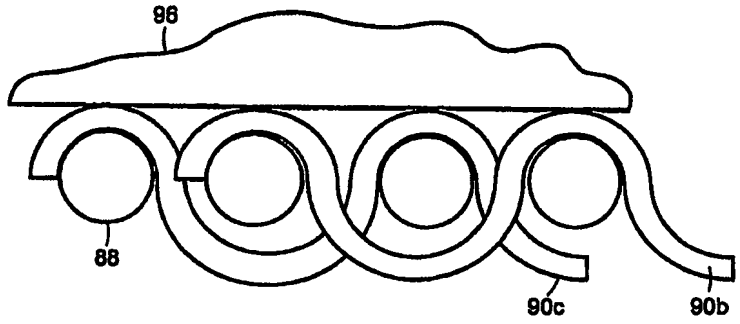


FIG. 13A

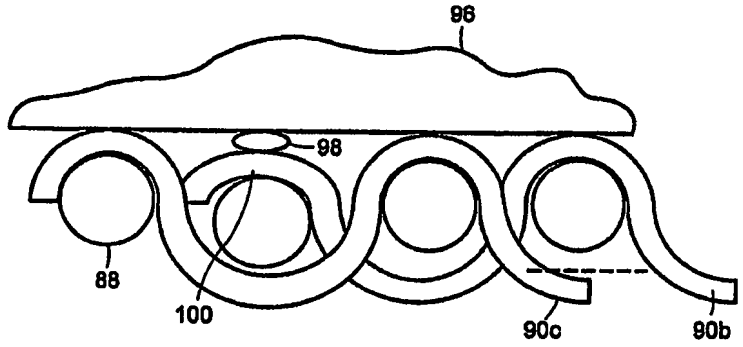


FIG. 13B

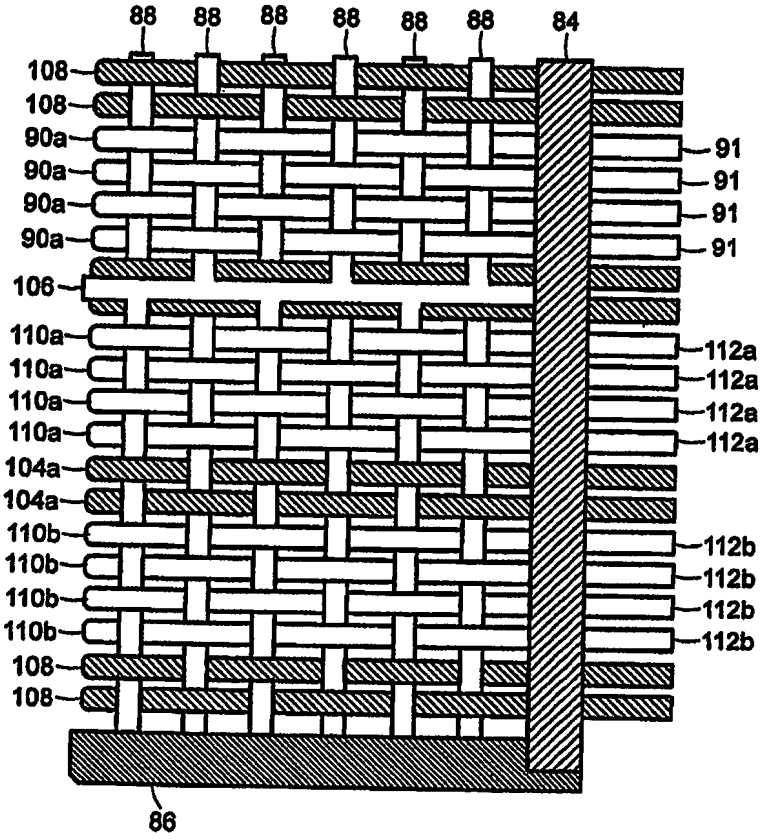

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FIG. 14

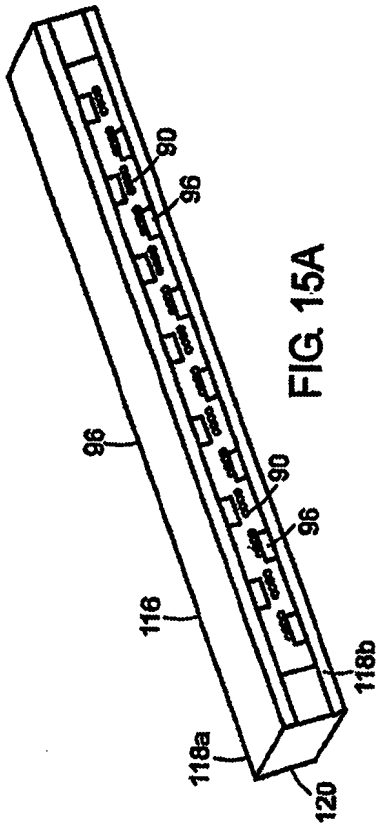

FIG. 15A

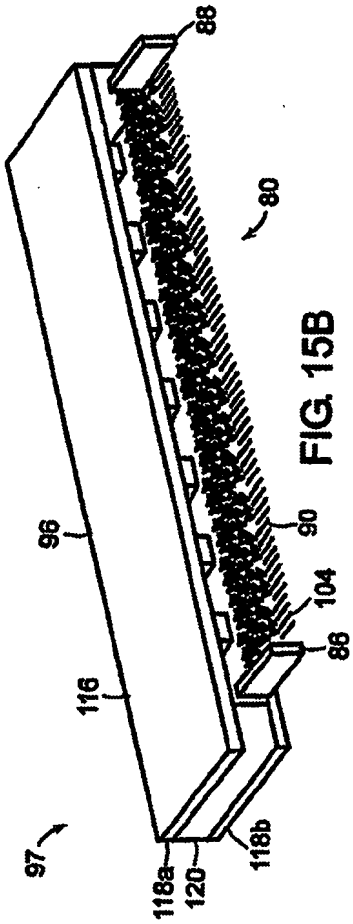

FIG. 15B

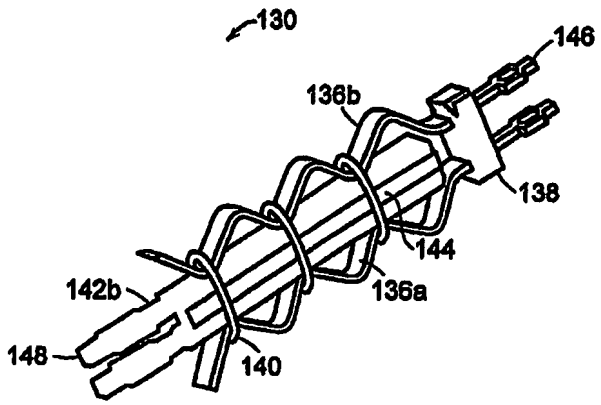

FIG. 16A

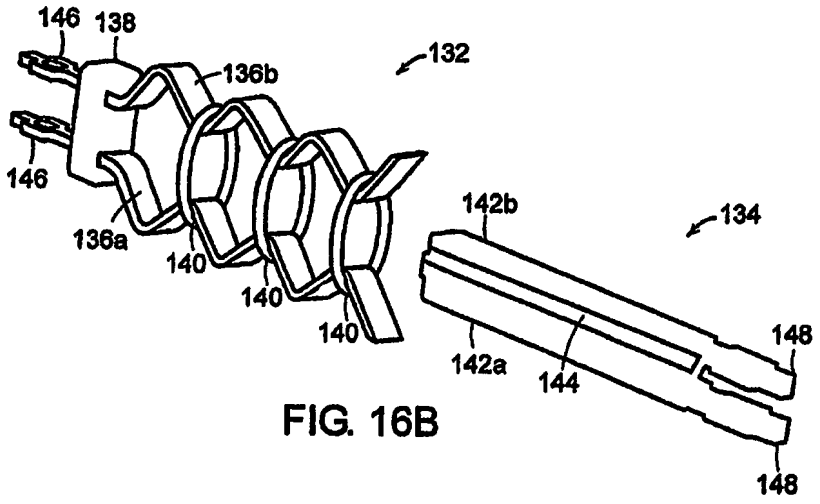

FIG. 16B

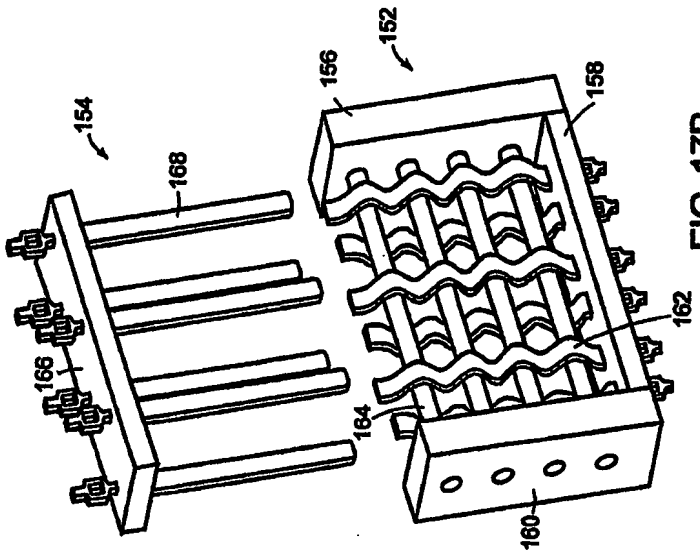

FIG. 17B

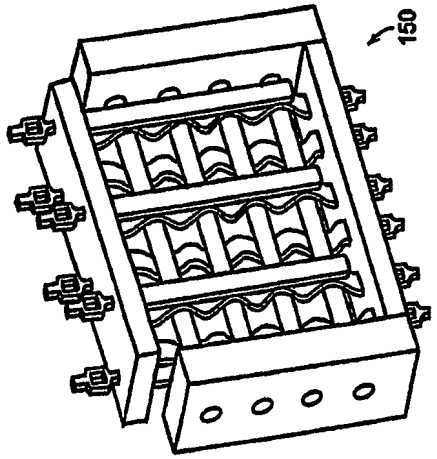

FIG. 17A

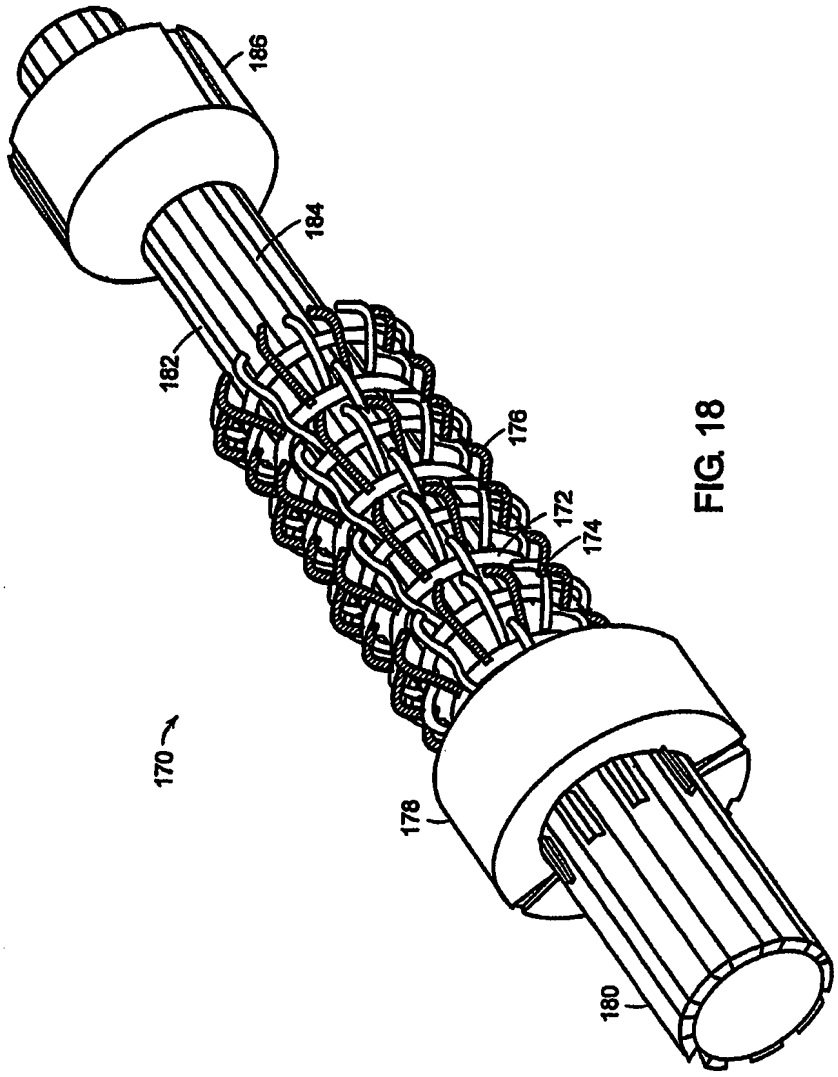

FIG. 18

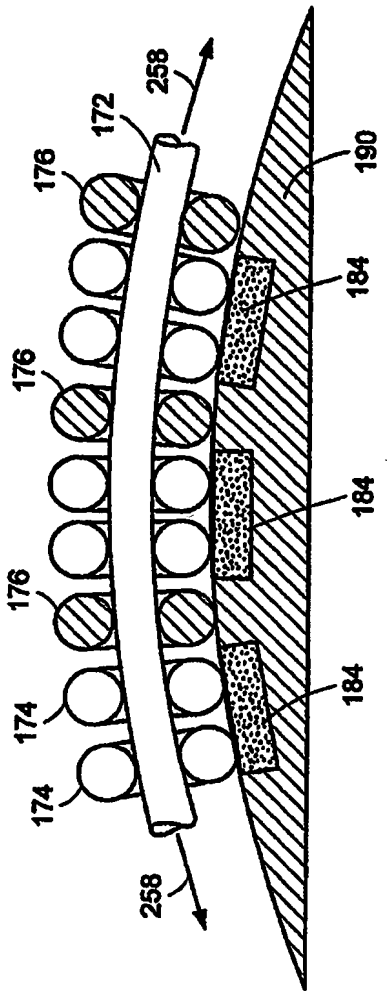

FIG. 19

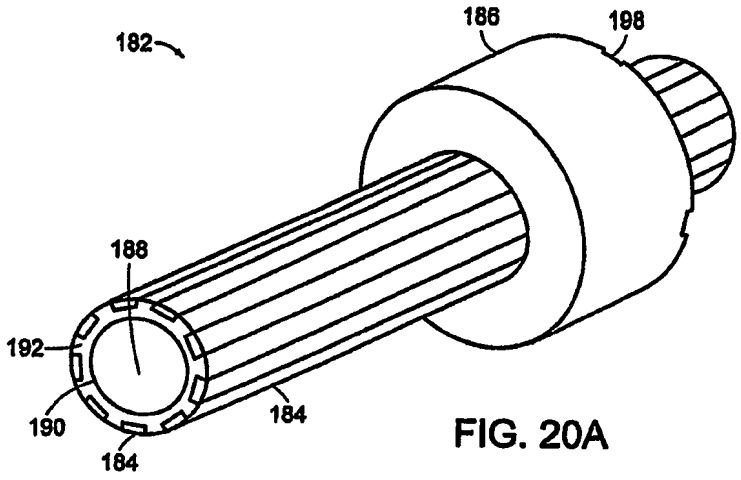

FIG. 20A

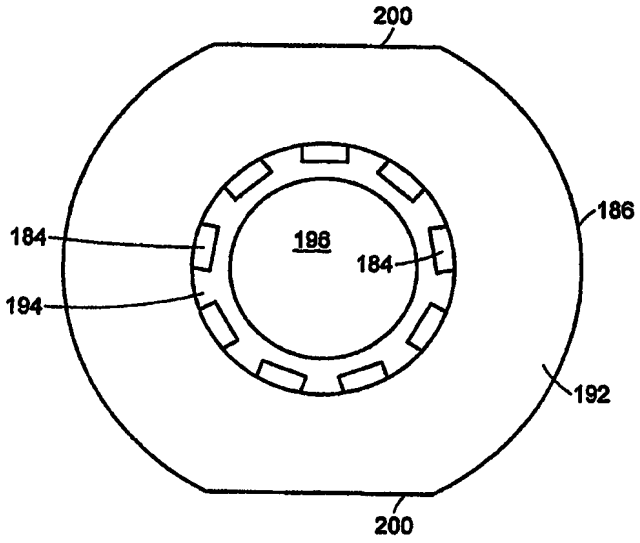

FIG. 20B

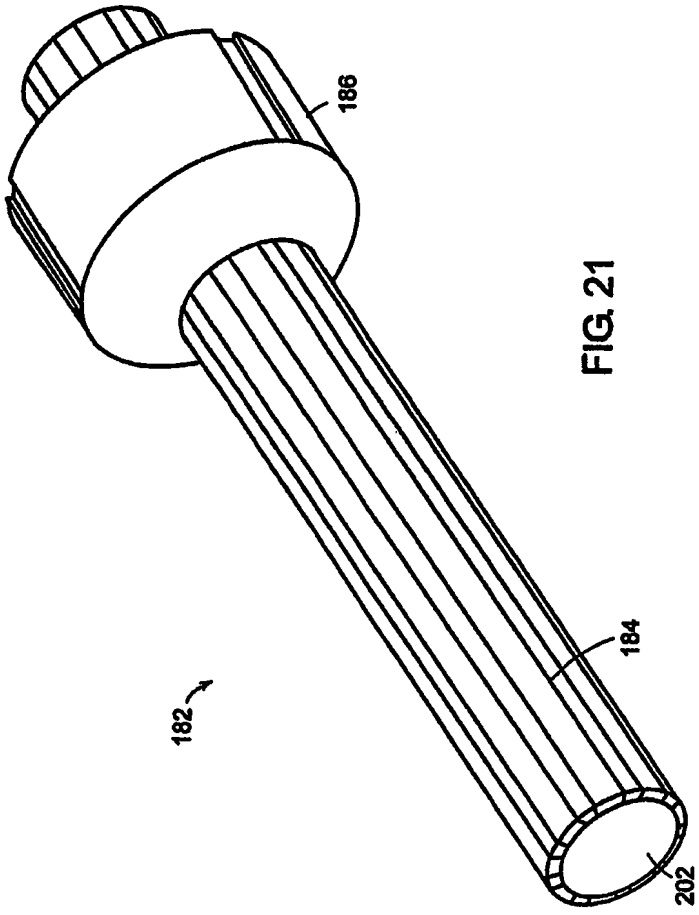

FIG. 21

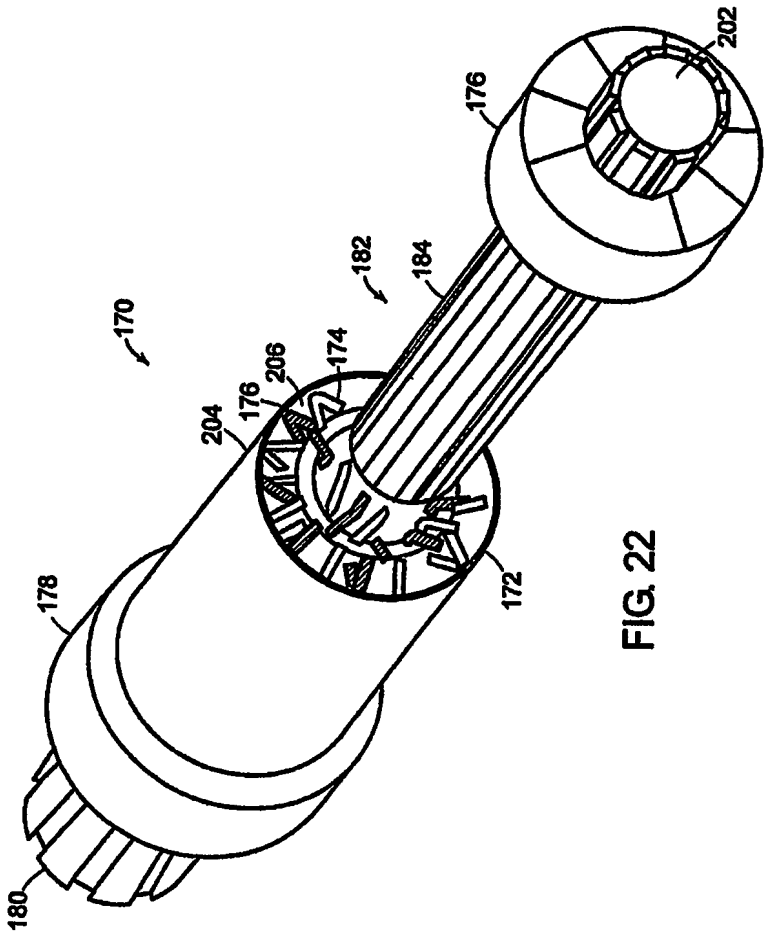

FIG. 22

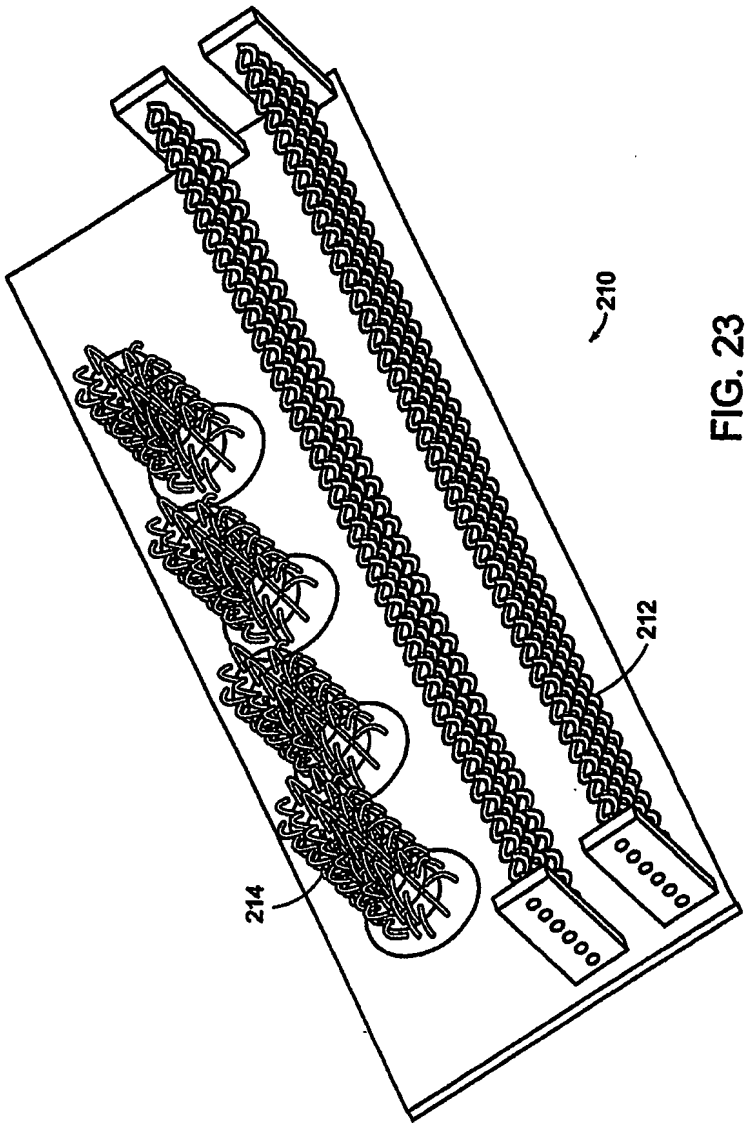

FIG. 23

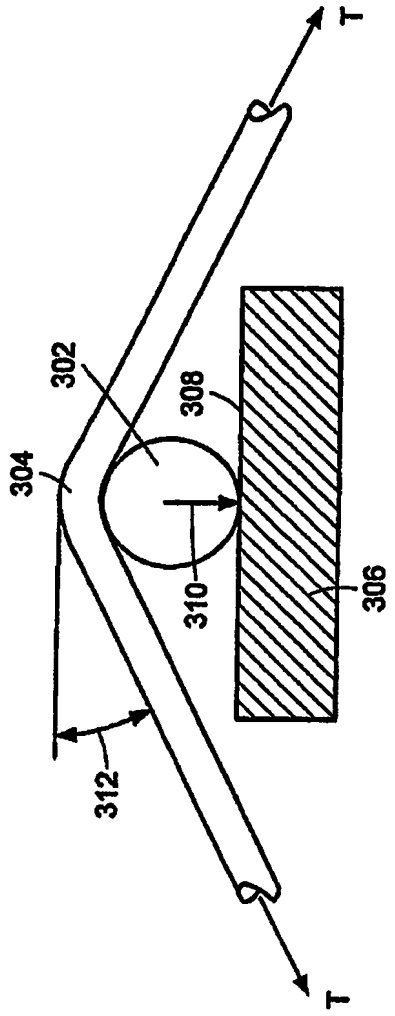

FIG. 24

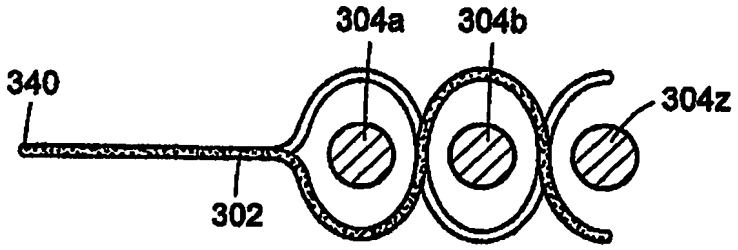

FIG. 25A

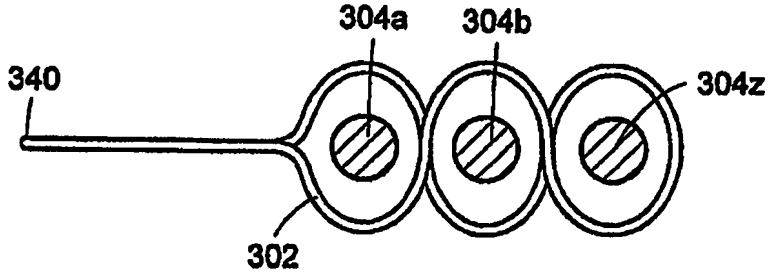

FIG. 25B

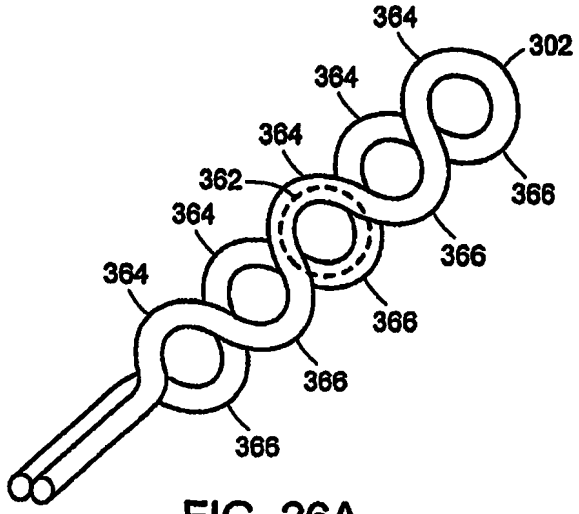

FIG. 26A

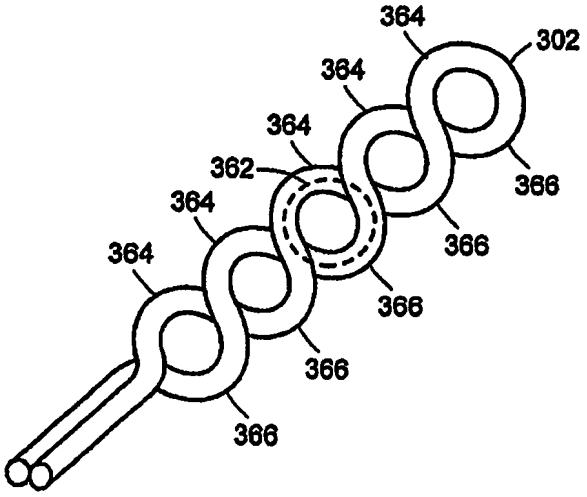

FIG. 26B

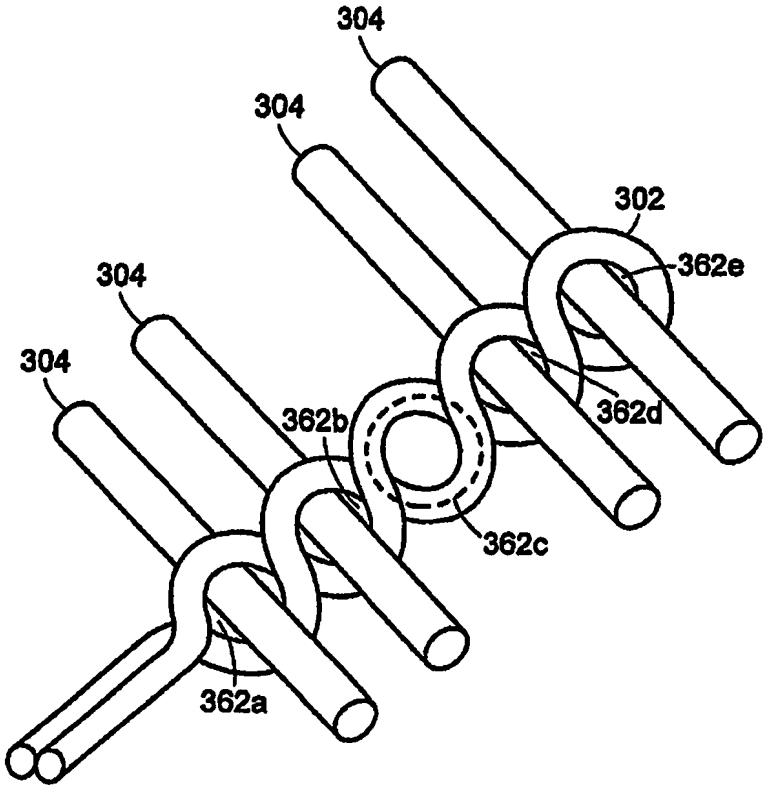

FIG. 26C

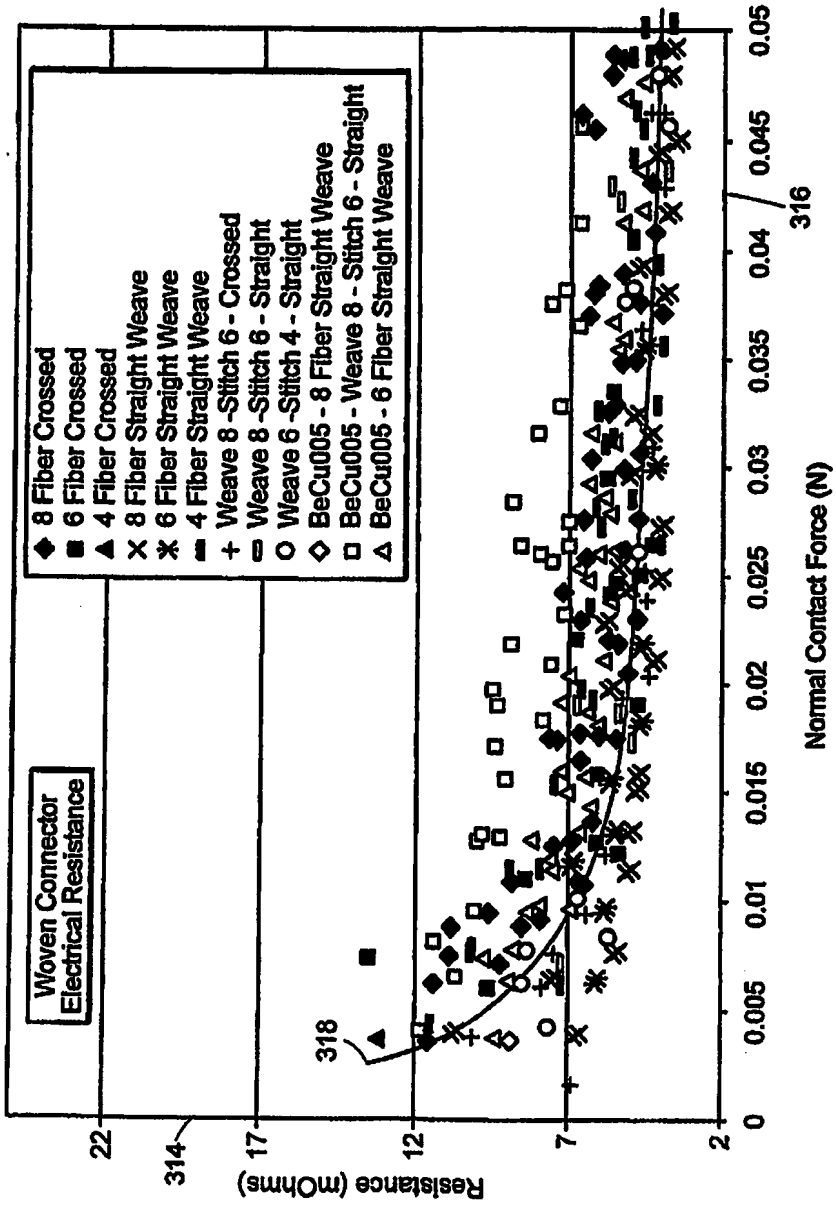
Woven Connector
Electrical Resistance
8 Fiber Crossed
6 Fiber Crossed
4 Fiber Crossed
8 Fiber Straight Weave
6 Fiber Straight Weave
4 Fiber Straight Weave
Weave 8 -Stitch 6 - Crossed
Weave 8 -Stitch 6 - Straight
Weave 6 -Stitch 4 - Straight
BeCu005 - 8 Fiber Straight Weave
BeCu005 - Weave 8 - Stitch 6 - Straight
BeCu005 - 6 Fiber Straight Weave
318
316
314
Resistance (mOhms)
Normal Contact Force (N)
22
17
12
7
2
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
0.05

FIG. 27

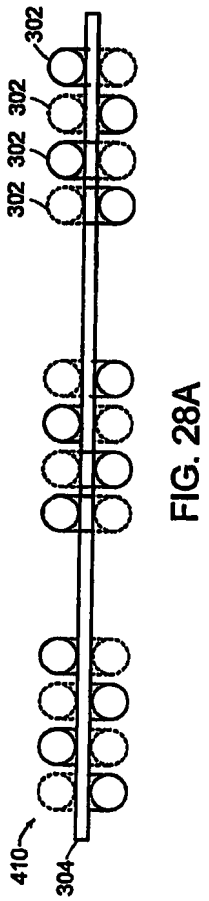

FIG. 28A

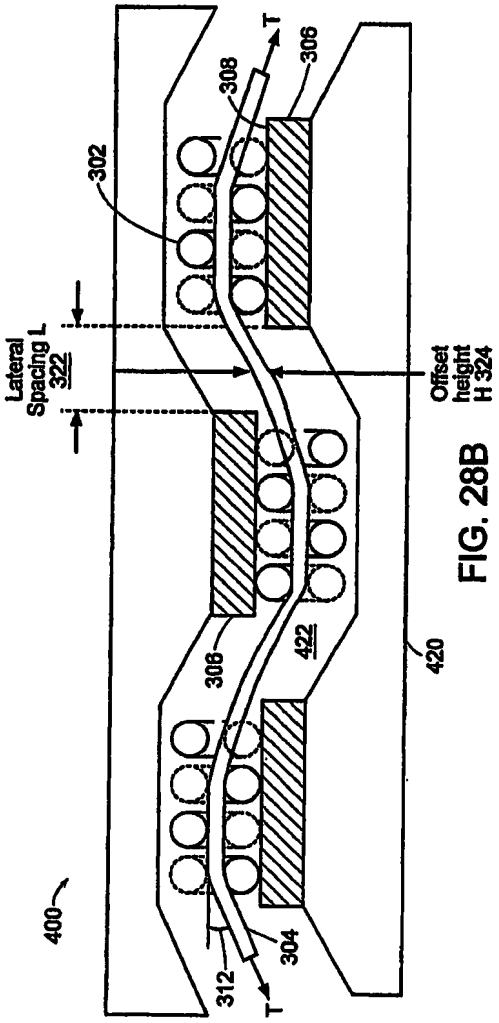

FIG. 28B

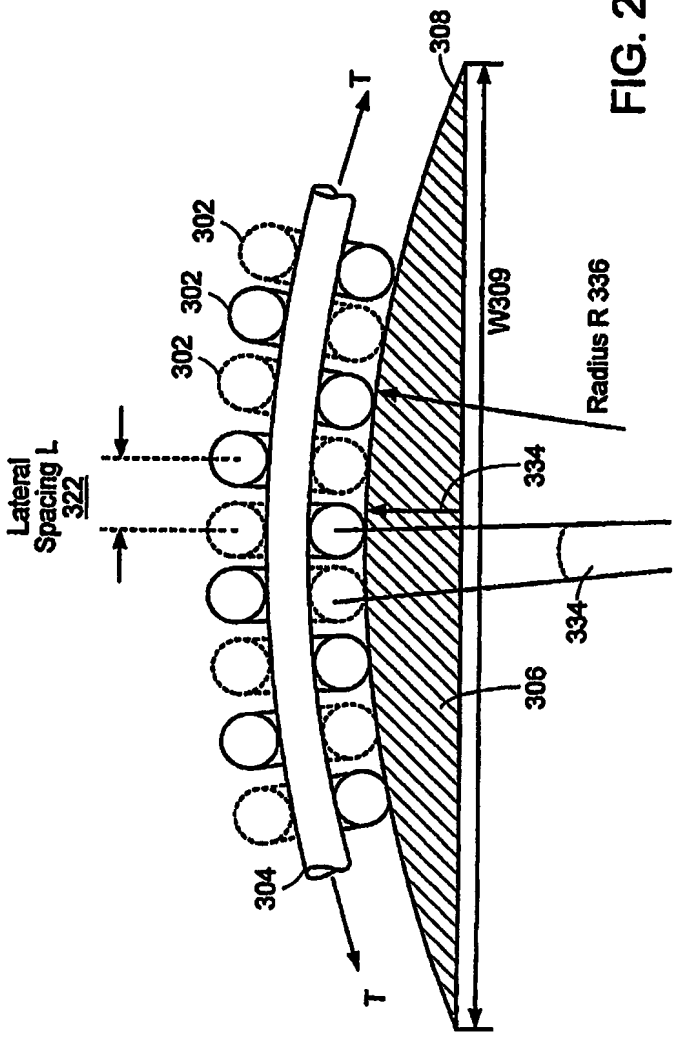
308
T
302
302
302
W309
Radius R 336
Lateral Spacing L 322
334
334
306
304
T

FIG. 29

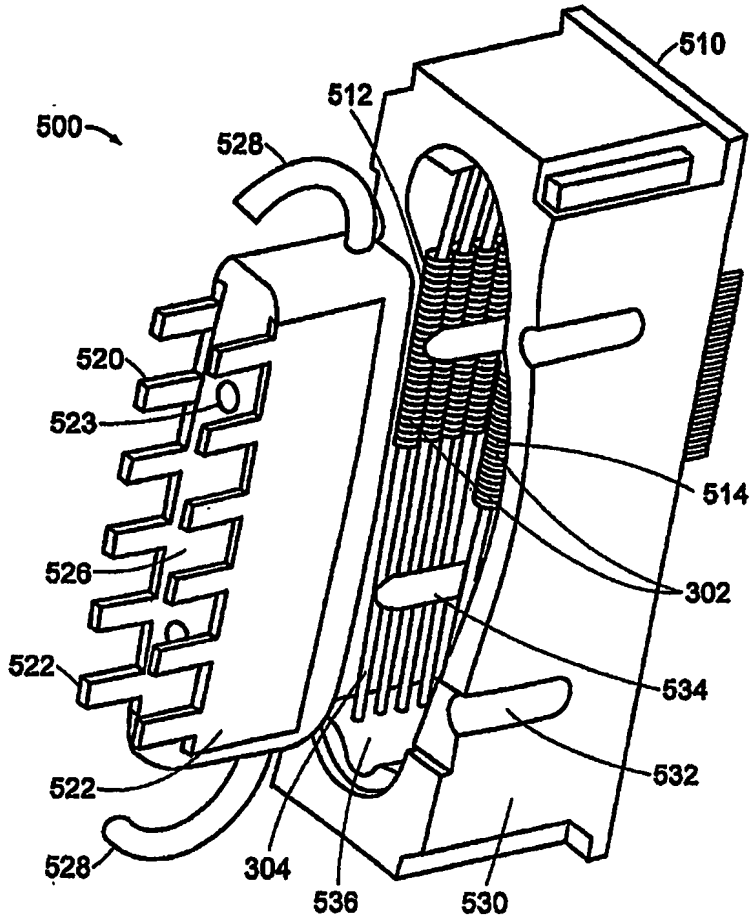
500
510
512
528
520
523
514
526
302
522
534
532
522
528
304
536
530

FIG. 30

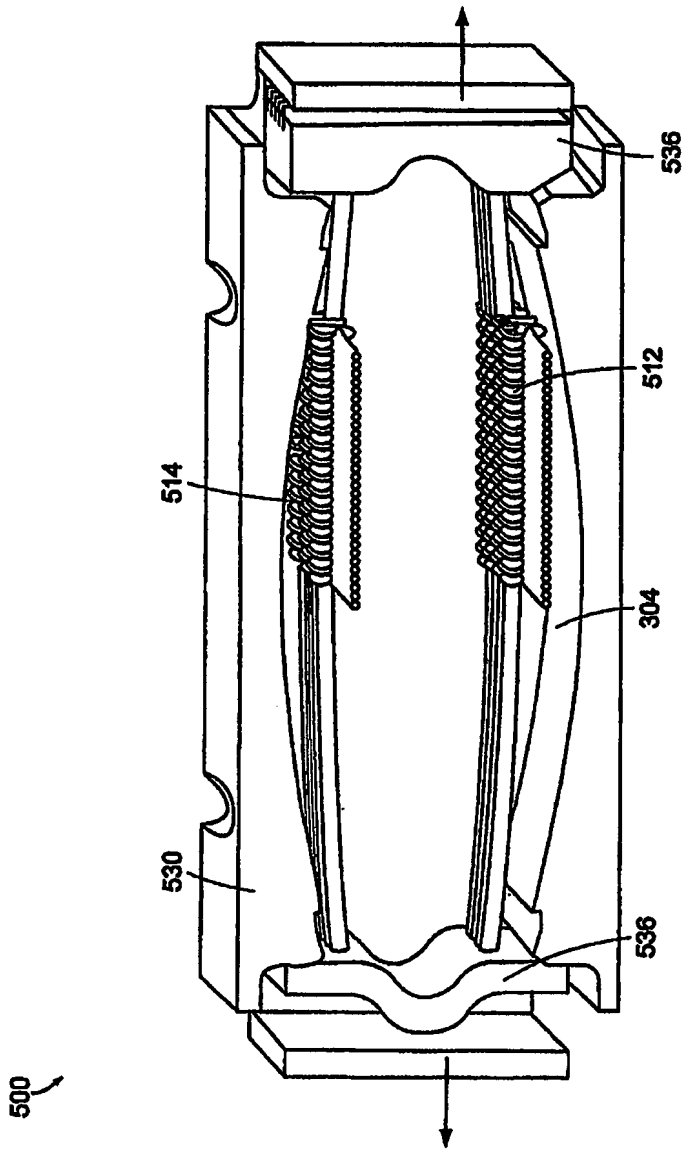

FIG. 31

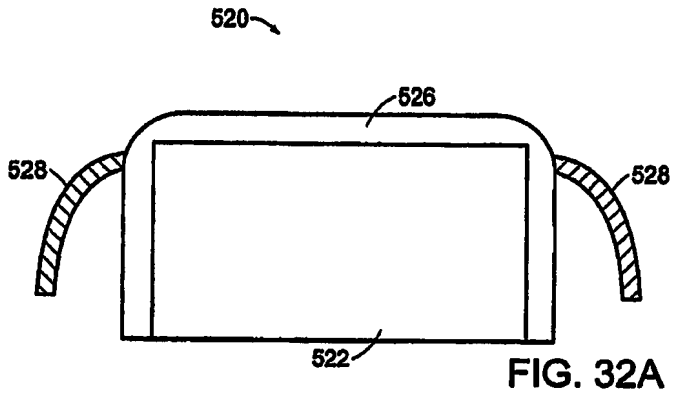

FIG. 32A

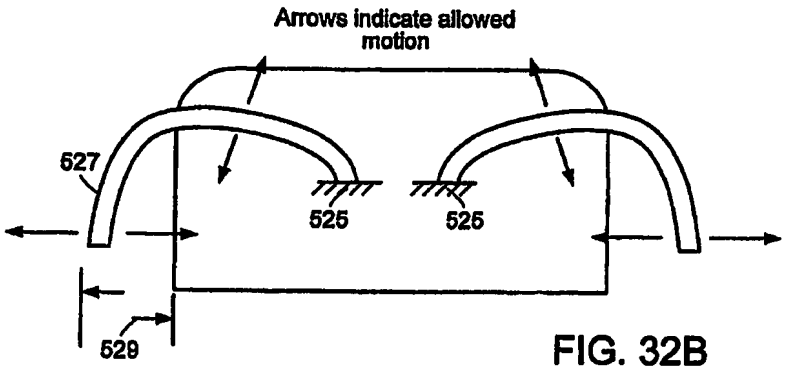

FIG. 32B

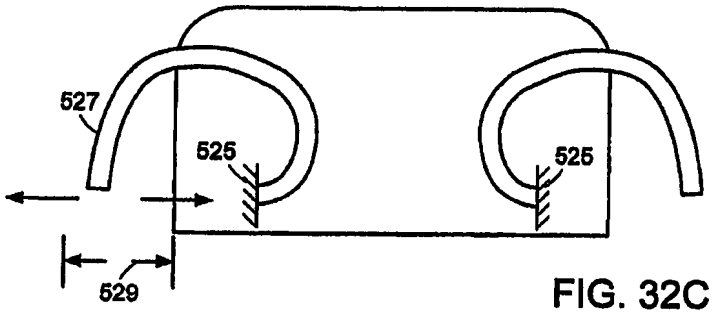

FIG. 32C

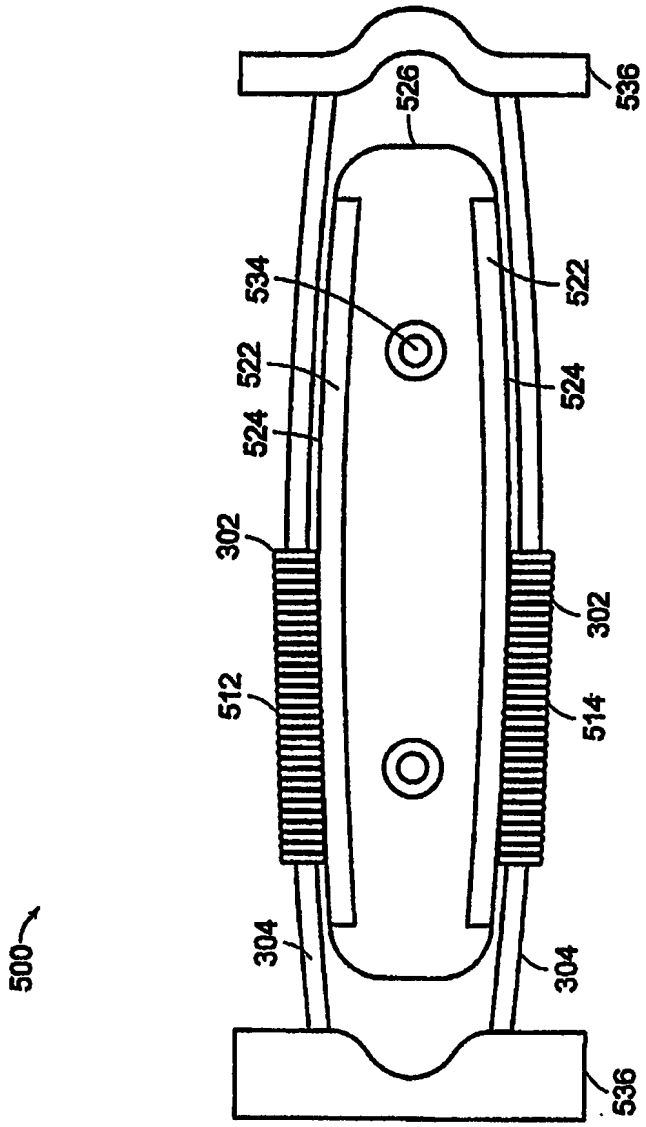

FIG. 33

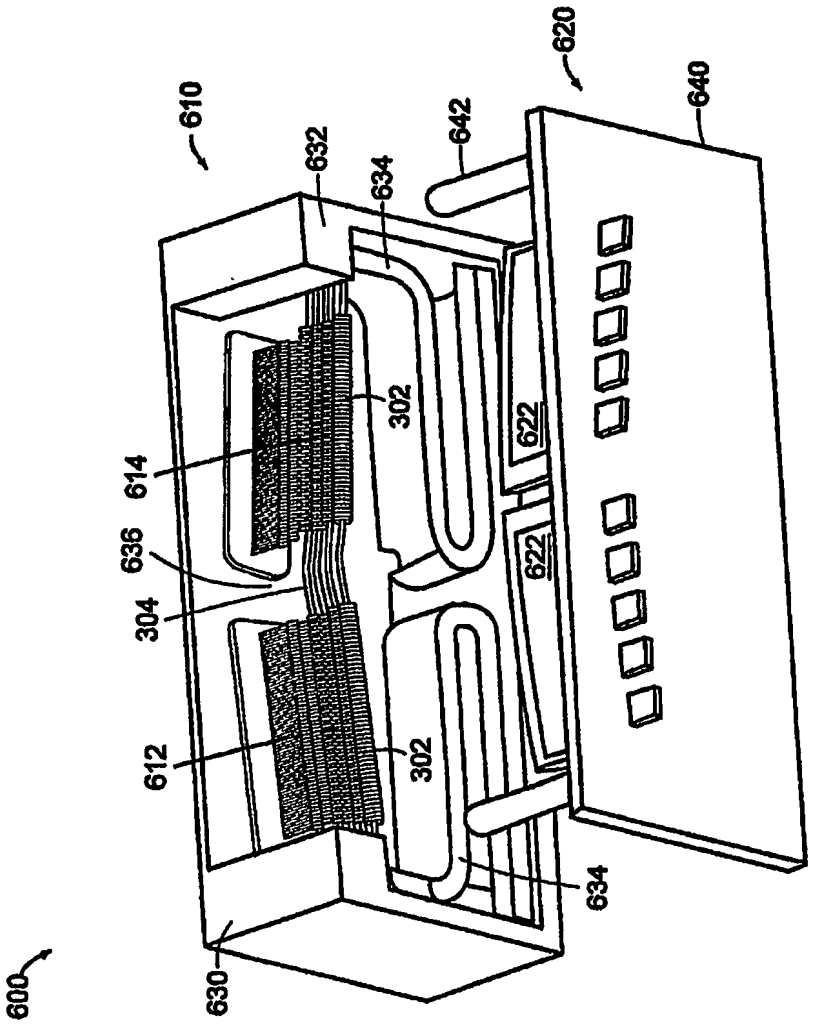
600
610
612
614
620
622
622
630
632
634
634
636
640
642
302
302
304

FIG. 34

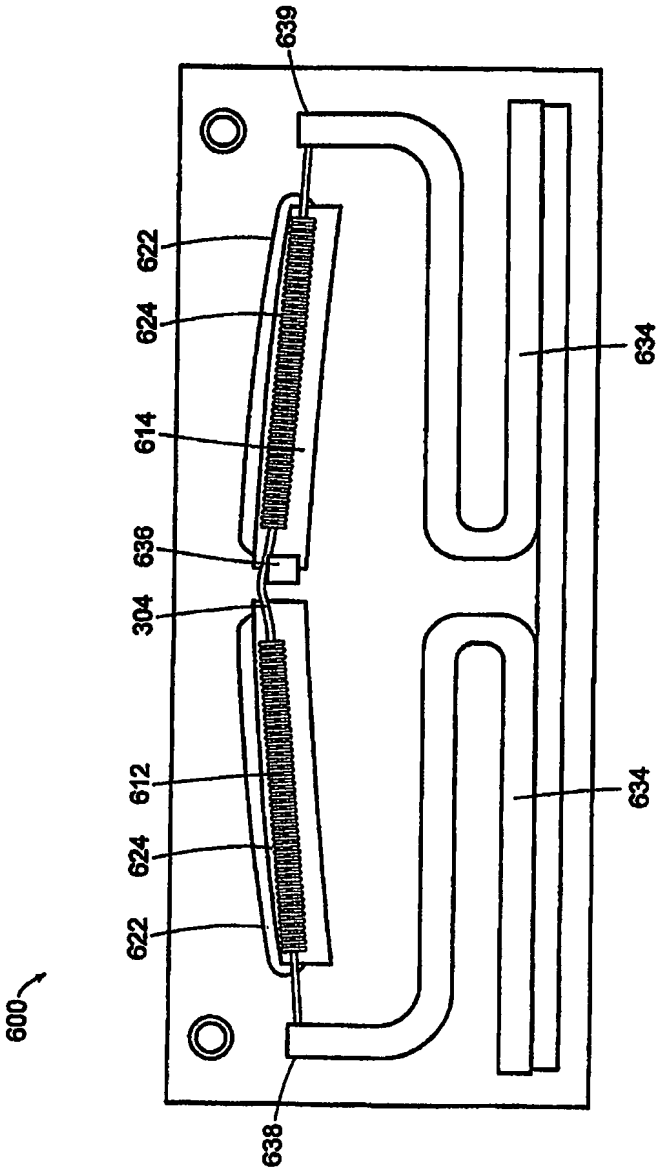

FIG. 35

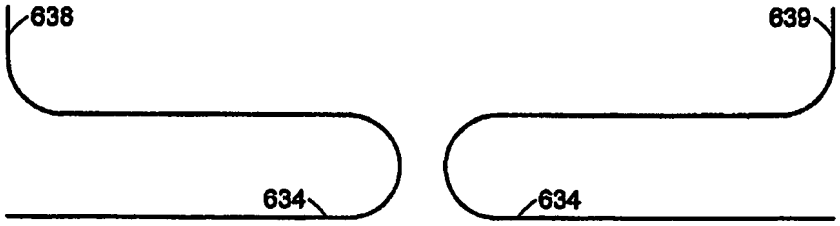

FIG. 36A

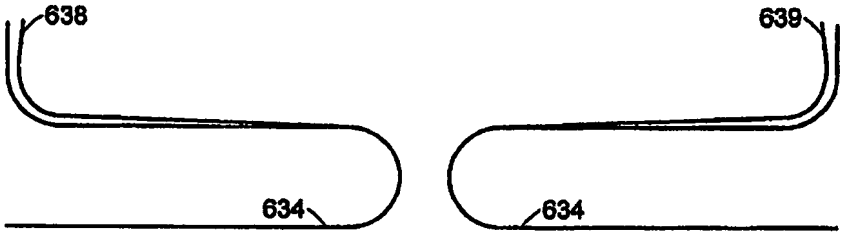

FIG. 36B

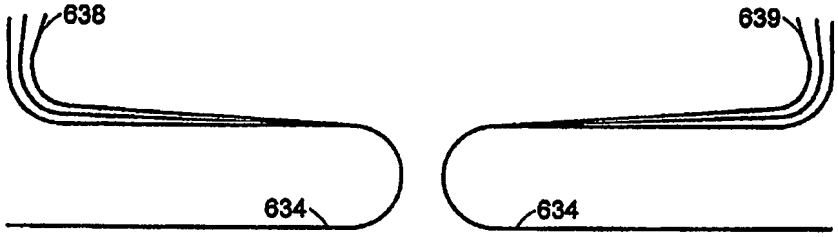

FIG. 36C

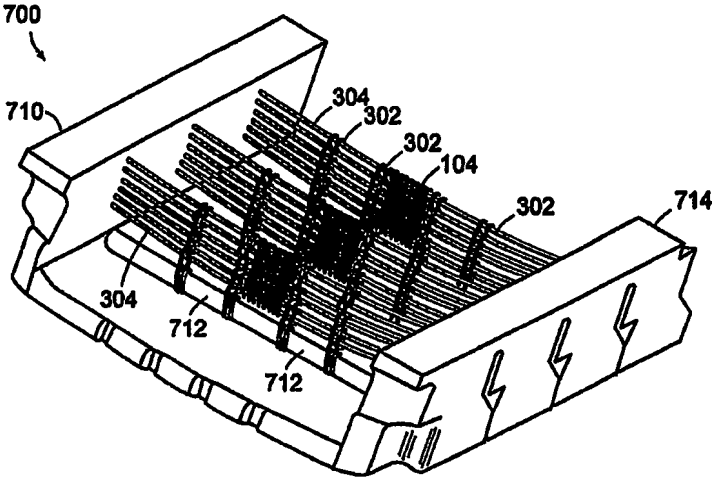

FIG. 37A

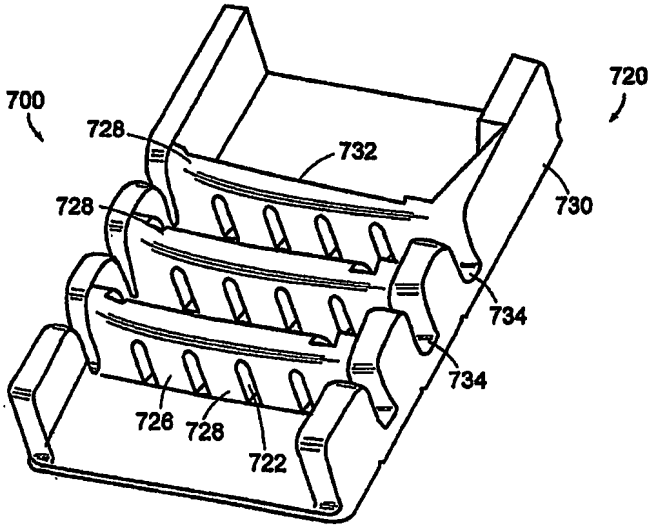

FIG. 37B

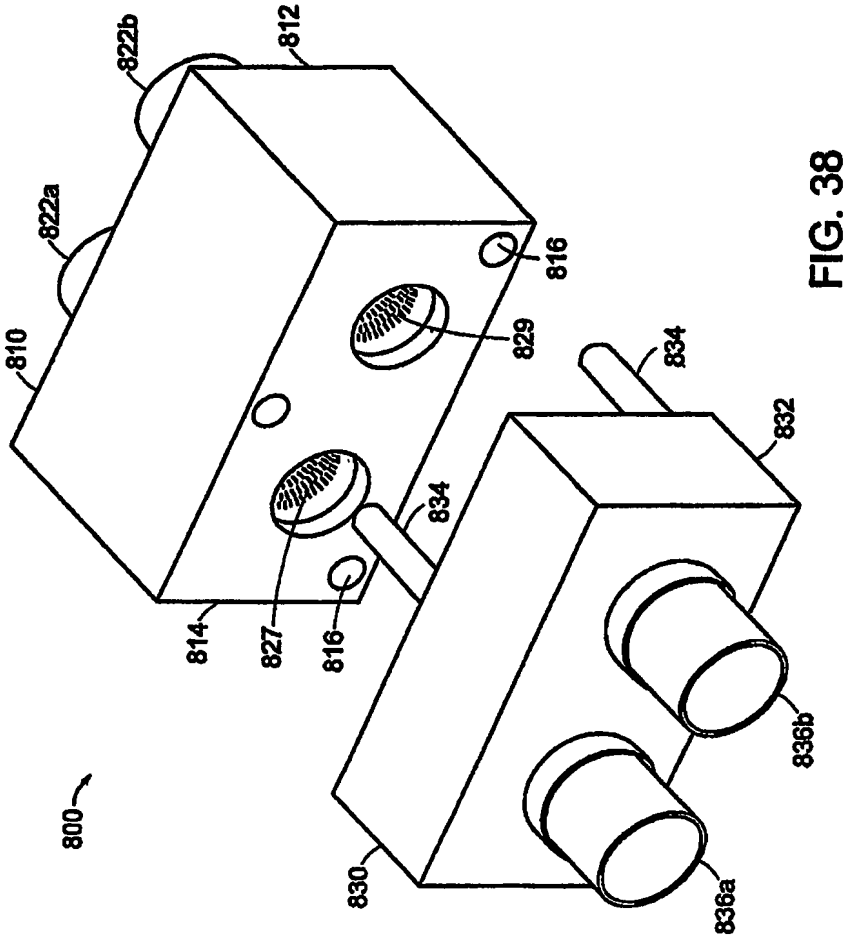
822b
812
822a
816
810
829
834
832
834
814
827
816
836b
800
830
836a

FIG. 38

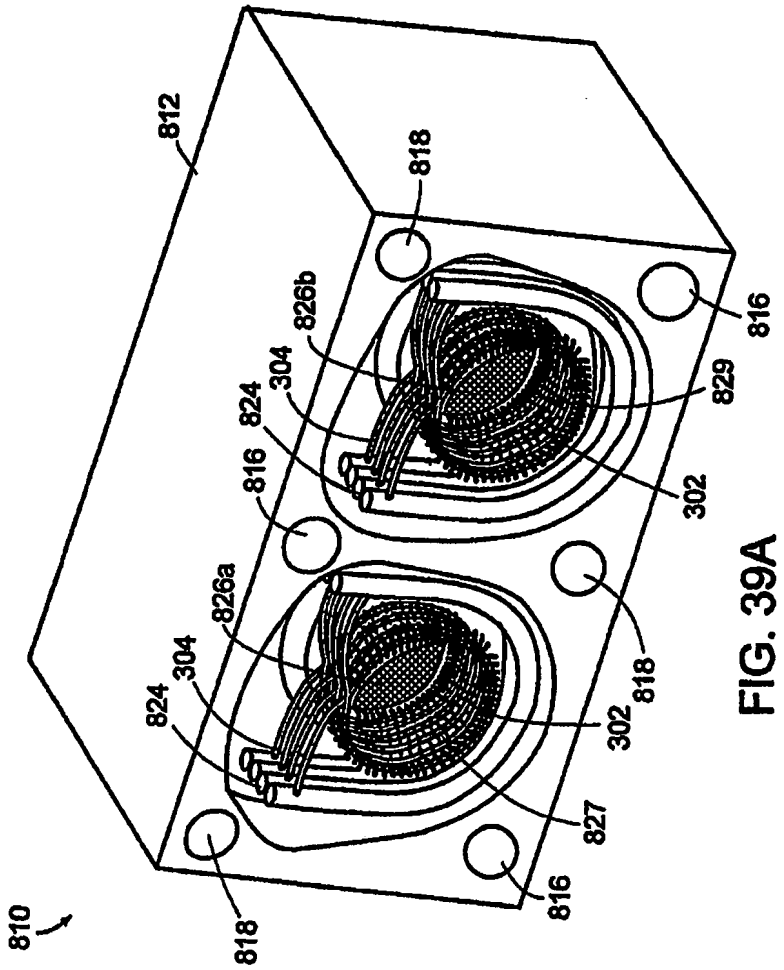
812
818
826b
816
304
824
829
816
302
826a
304
824
818
302
827
816
818
810

FIG. 39A

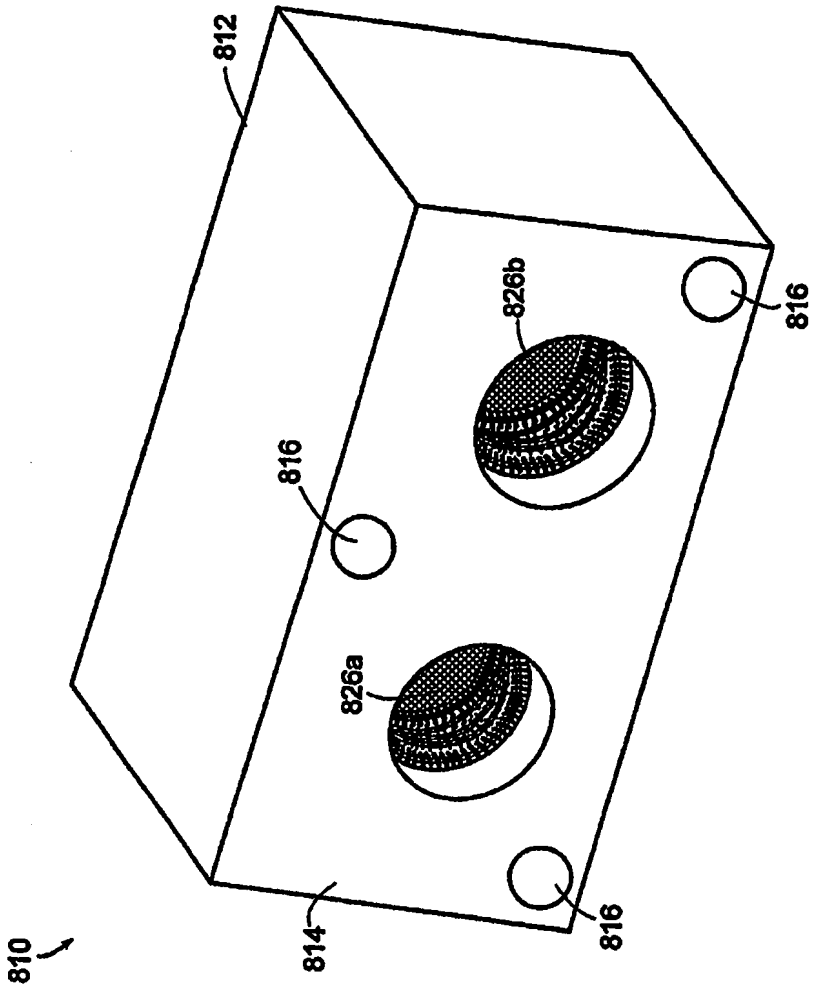

FIG. 39B

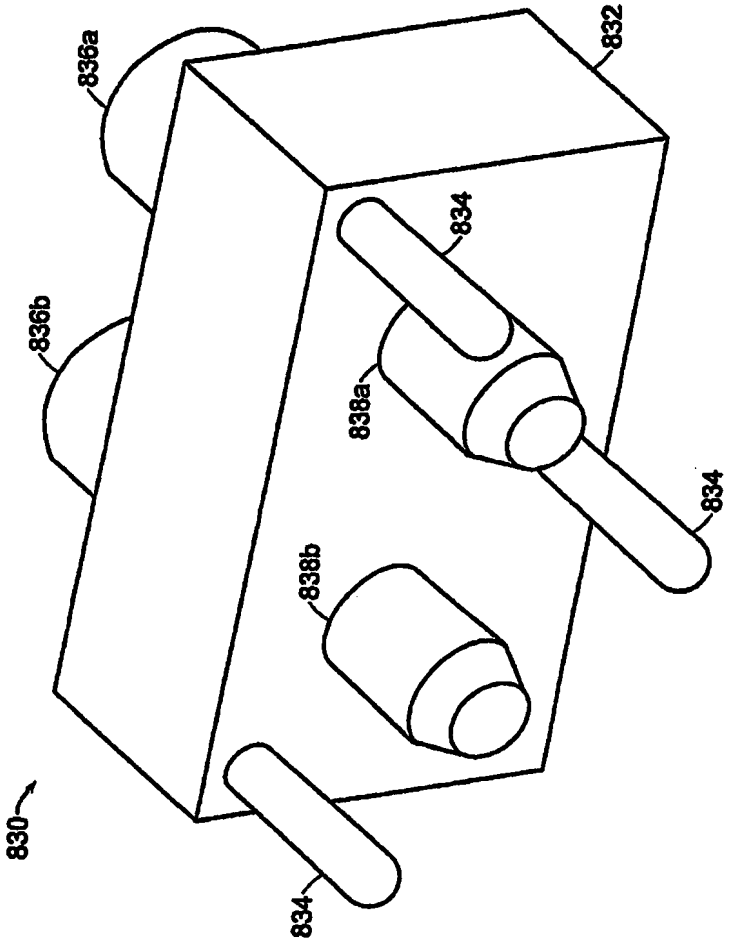

FIG. 40

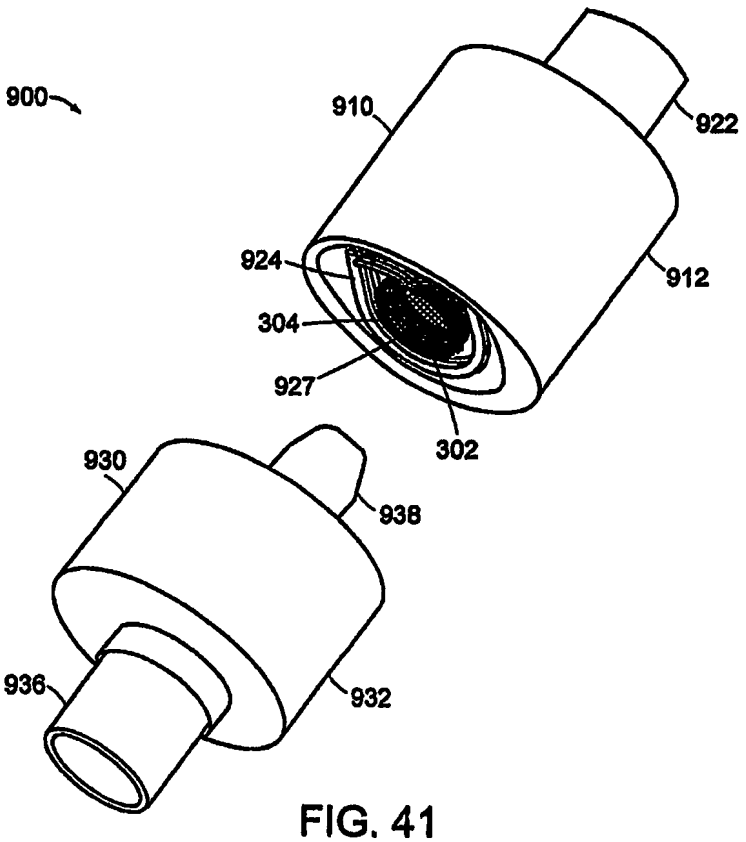

FIG. 41